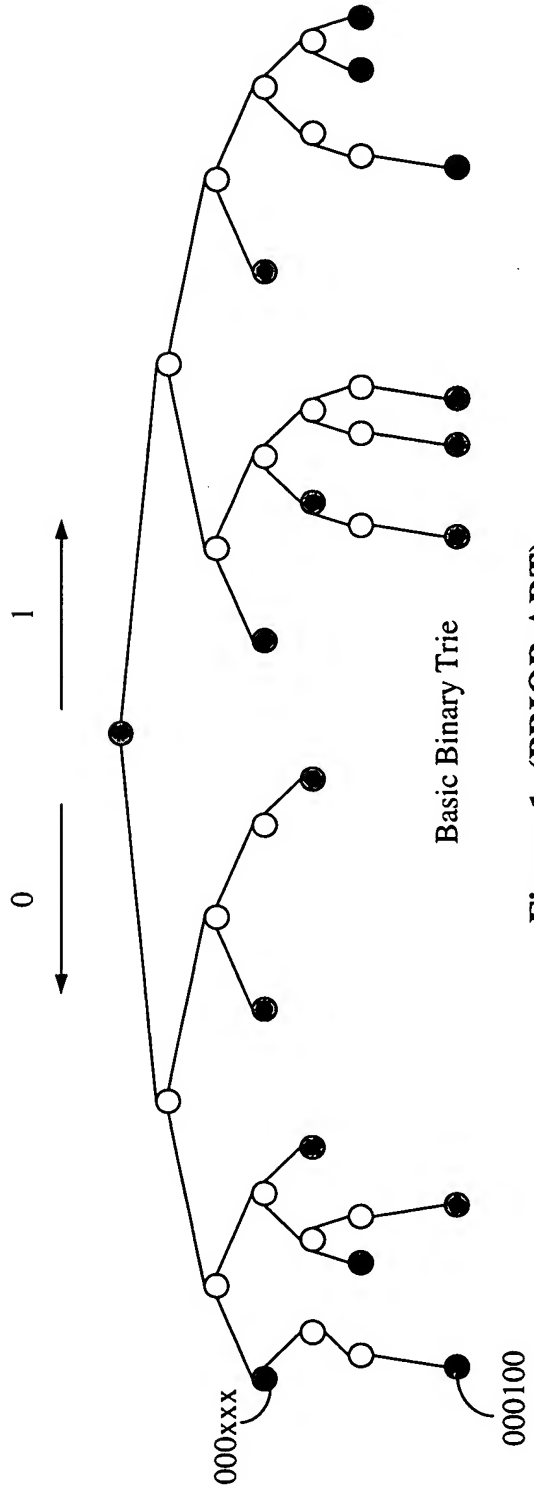

Figure 1. (PRIOR ART)

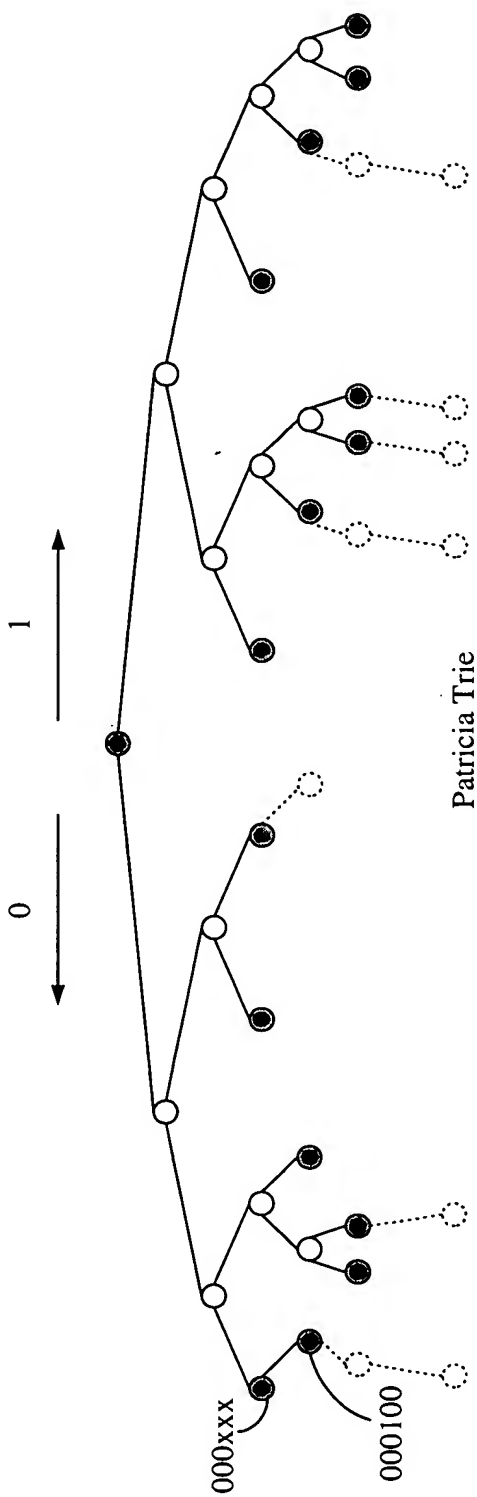

Figure 2. (PRIOR ART)

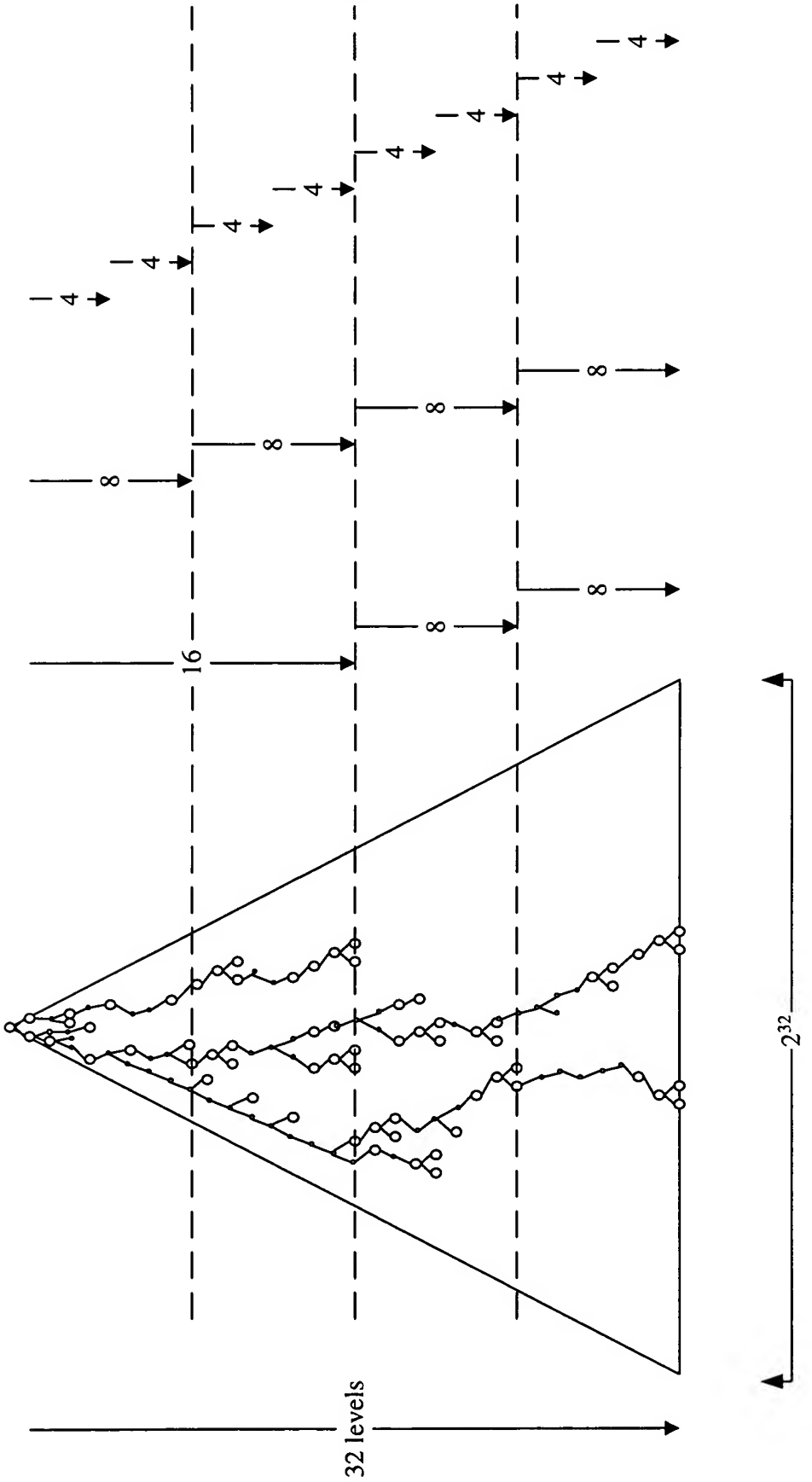

Figure 3. (PRIOR ART)

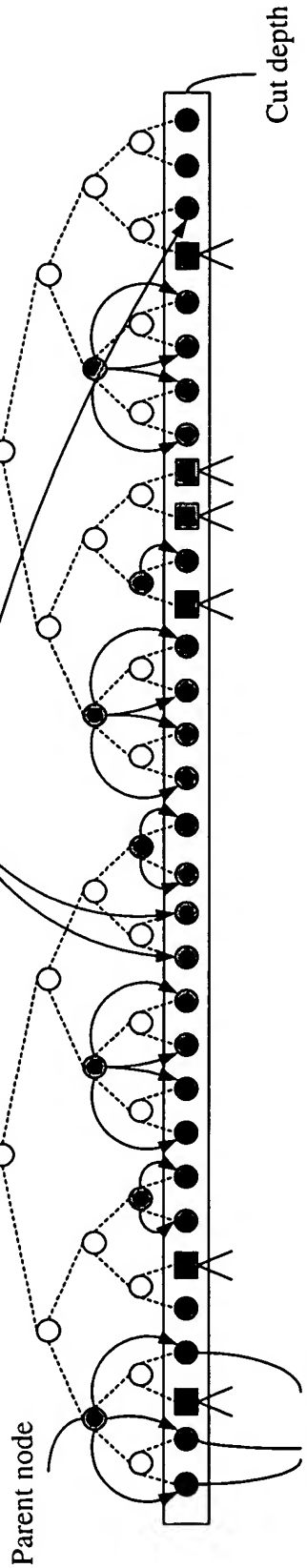

Figure 4. (PRIOR ART)

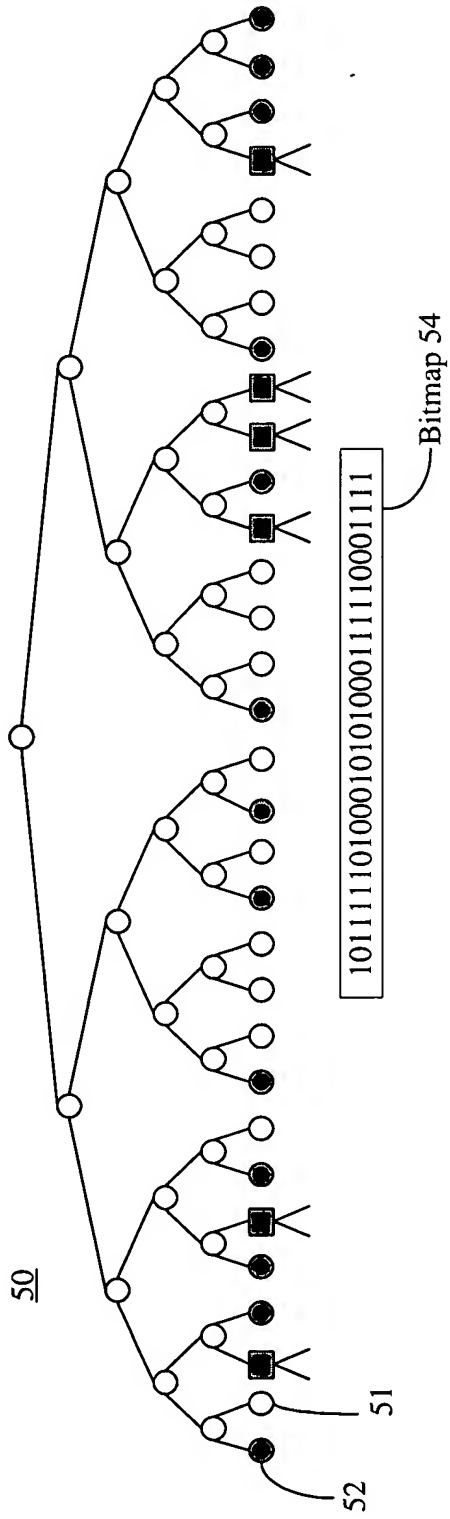

Figure 6.

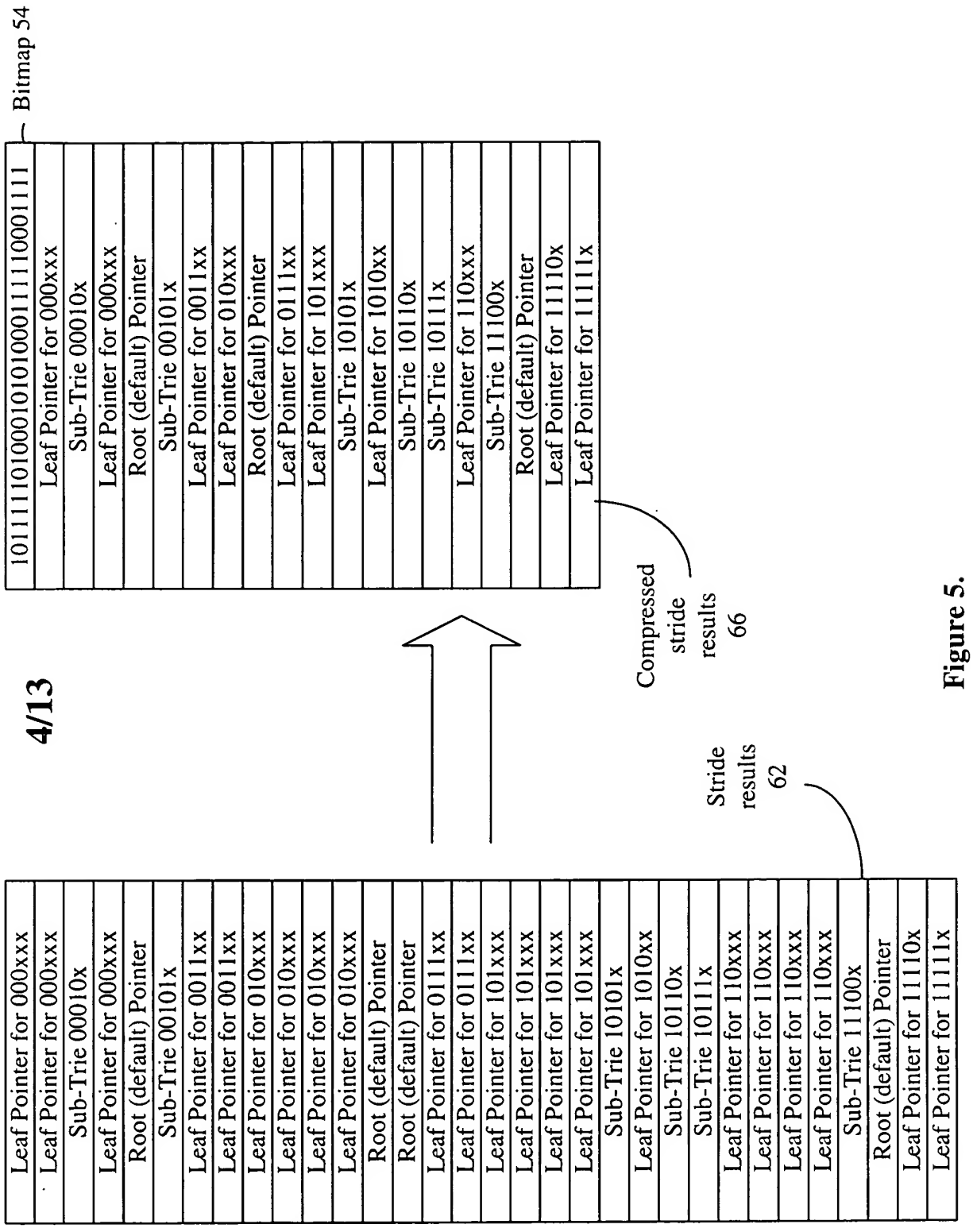
Bitmap 54
1011111010001010100011111110001111
Leaf Pointer for 000xxx
Leaf Pointer for 000xxx
Sub-Trie 00010x
Leaf Pointer for 000xxx
Root (default) Pointer
Sub-Trie 00101x
Leaf Pointer for 0011xx
Leaf Pointer for 0011xx
Leaf Pointer for 010xxx
Leaf Pointer for 010xxx
Leaf Pointer for 010xxx
Leaf Pointer for 010xxx
Root (default) Pointer
Leaf Pointer for 0111xx
Leaf Pointer for 0111xx
Leaf Pointer for 101xxx
Leaf Pointer for 101xxx
Leaf Pointer for 101xxx
Leaf Pointer for 101xxx
Sub-Trie 10101x
Leaf Pointer for 1010xx
Sub-Trie 10110x
Sub-Trie 10111x
Leaf Pointer for 110xxx
Leaf Pointer for 110xxx
Leaf Pointer for 110xxx
Leaf Pointer for 110xxx
Sub-Trie 11100x
Root (default) Pointer
Leaf Pointer for 11110x
Leaf Pointer for 11111x
Compressed stride results 66
Stride results 62

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Figure 5.

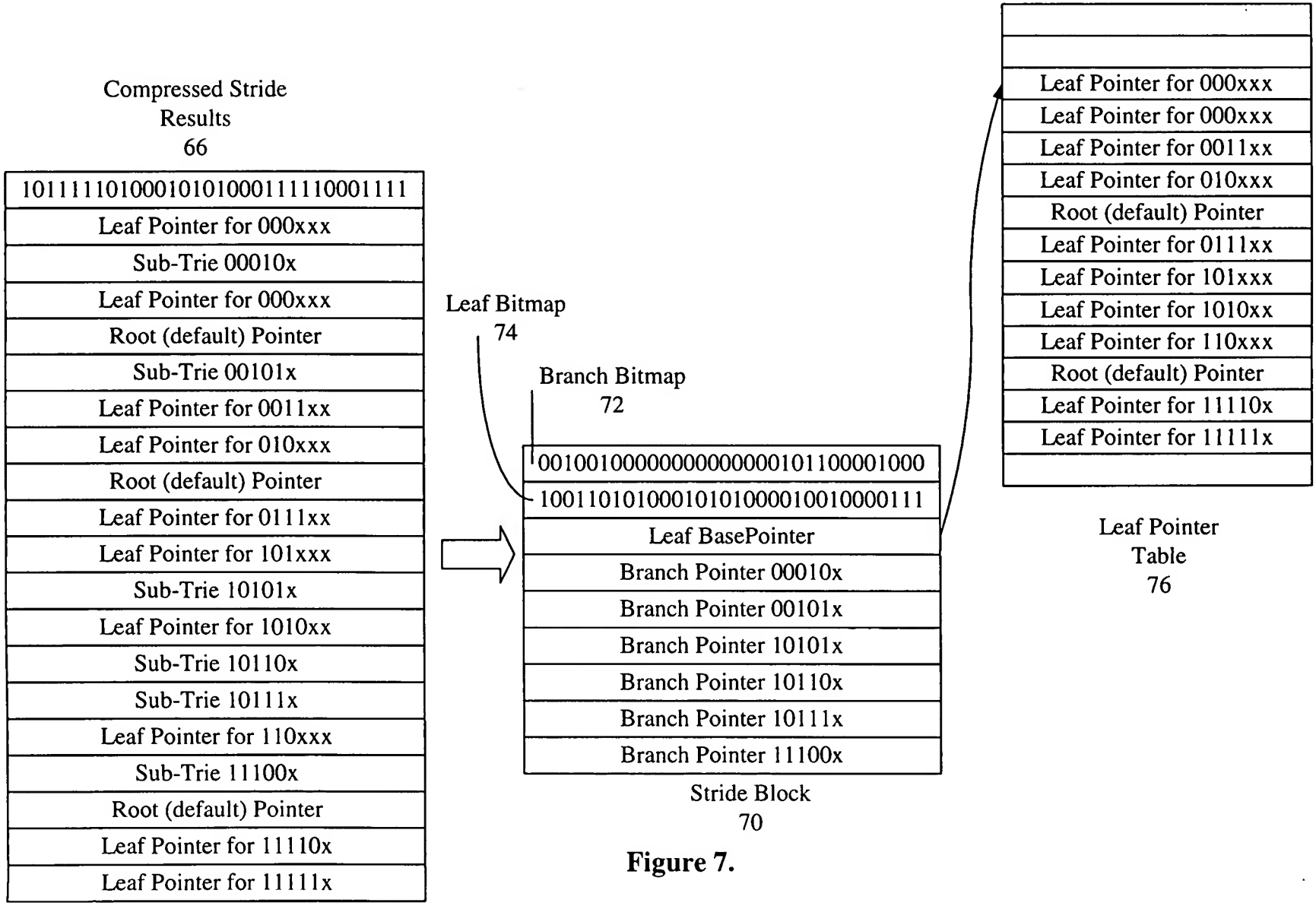
Compressed Stride Results 66
10111110100010101000111110001111
Leaf Pointer for 000xxx
Sub-Trie 00010x
Leaf Pointer for 000xxx
Root (default) Pointer
Sub-Trie 00101x
Leaf Pointer for 0011xx
Leaf Pointer for 010xxx
Root (default) Pointer
Leaf Pointer for 0111xx
Leaf Pointer for 101xxx
Sub-Trie 10101x
Leaf Pointer for 1010xx
Sub-Trie 10110x
Sub-Trie 10111x
Leaf Pointer for 110xxx
Sub-Trie 11100x
Root (default) Pointer
Leaf Pointer for 11110x
Leaf Pointer for 11111x
Leaf Bitmap 74
Branch Bitmap 72
00100100000000000000101100001000
10011010100010101000010010000111
Leaf BasePointer
Branch Pointer 00010x
Branch Pointer 00101x
Branch Pointer 10101x
Branch Pointer 10110x
Branch Pointer 10111x
Branch Pointer 11100x
Stride Block 70
Leaf Pointer for 000xxx
Leaf Pointer for 000xxx
Leaf Pointer for 0011xx
Leaf Pointer for 010xxx
Root (default) Pointer
Leaf Pointer for 0111xx
Leaf Pointer for 101xxx
Leaf Pointer for 1010xx
Leaf Pointer for 110xxx
Root (default) Pointer
Leaf Pointer for 11110x
Leaf Pointer for 11111x
Leaf Pointer Table 76

Figure 7.

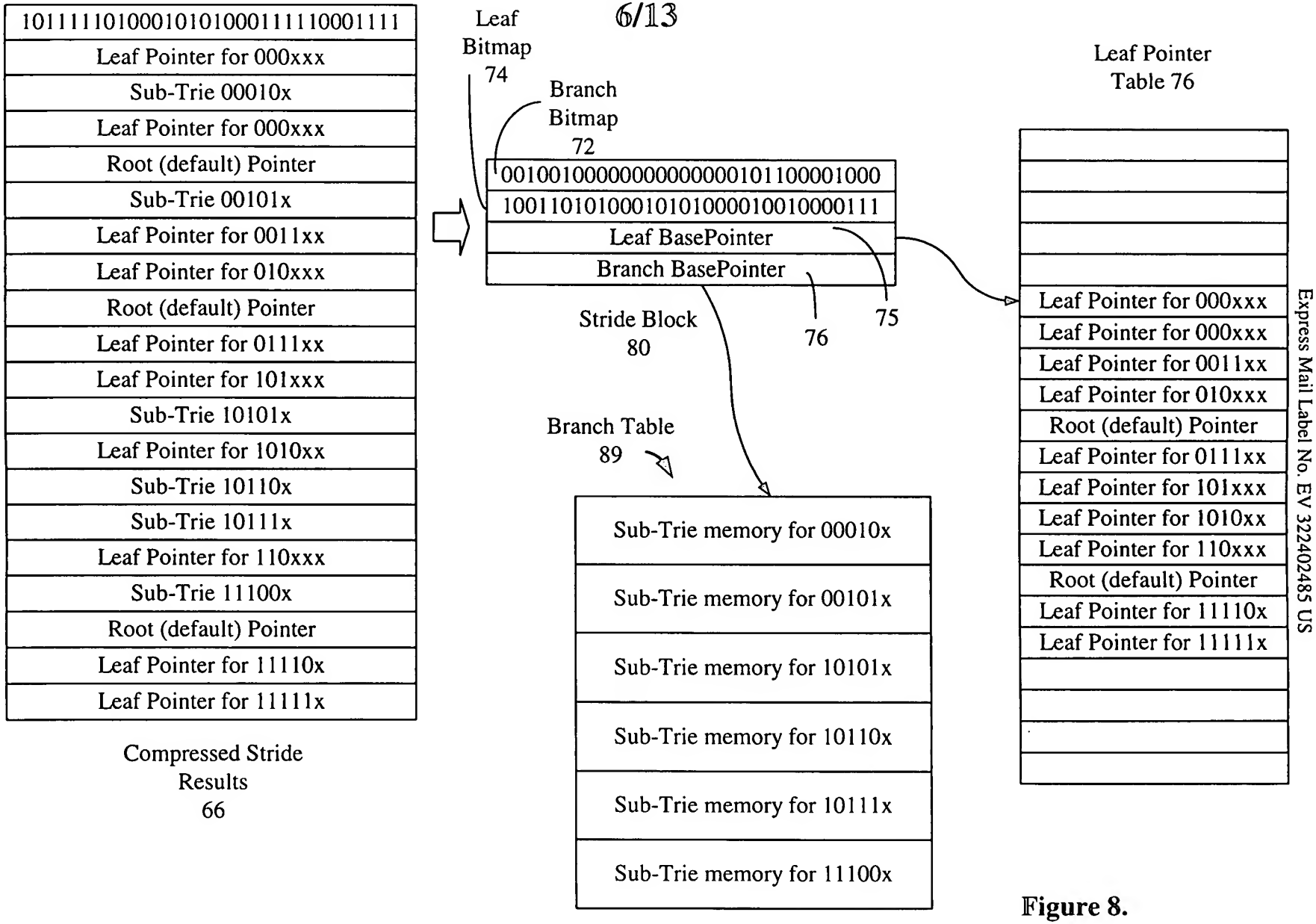
10111110100010101000111110001111
Leaf Pointer for 000xxx
Sub-Trie 00010x
Leaf Pointer for 000xxx
Root (default) Pointer
Sub-Trie 00101x
Leaf Pointer for 0011xx
Leaf Pointer for 010xxx
Root (default) Pointer
Leaf Pointer for 0111xx
Leaf Pointer for 101xxx
Sub-Trie 10101x
Leaf Pointer for 1010xx
Sub-Trie 10110x
Sub-Trie 10111x
Leaf Pointer for 110xxx
Sub-Trie 11100x
Root (default) Pointer
Leaf Pointer for 11110x
Leaf Pointer for 11111x
Compressed Stride Results 66
Leaf Bitmap 74
Branch Bitmap 72
00100100000000000000101100001000
10011010100010101000010010000111
Leaf BasePointer
Branch BasePointer
75
76
Stride Block 80
Branch Table 89
Sub-Trie memory for 00010x
Sub-Trie memory for 00101x
Sub-Trie memory for 10101x
Sub-Trie memory for 10110x
Sub-Trie memory for 10111x
Sub-Trie memory for 11100x
Leaf Pointer Table 76
Leaf Pointer for 000xxx
Leaf Pointer for 000xxx
Leaf Pointer for 0011xx
Leaf Pointer for 010xxx
Root (default) Pointer
Leaf Pointer for 0111xx
Leaf Pointer for 101xxx
Leaf Pointer for 1010xx
Leaf Pointer for 110xxx
Root (default) Pointer
Leaf Pointer for 11110x
Leaf Pointer for 11111x

Figure 8.

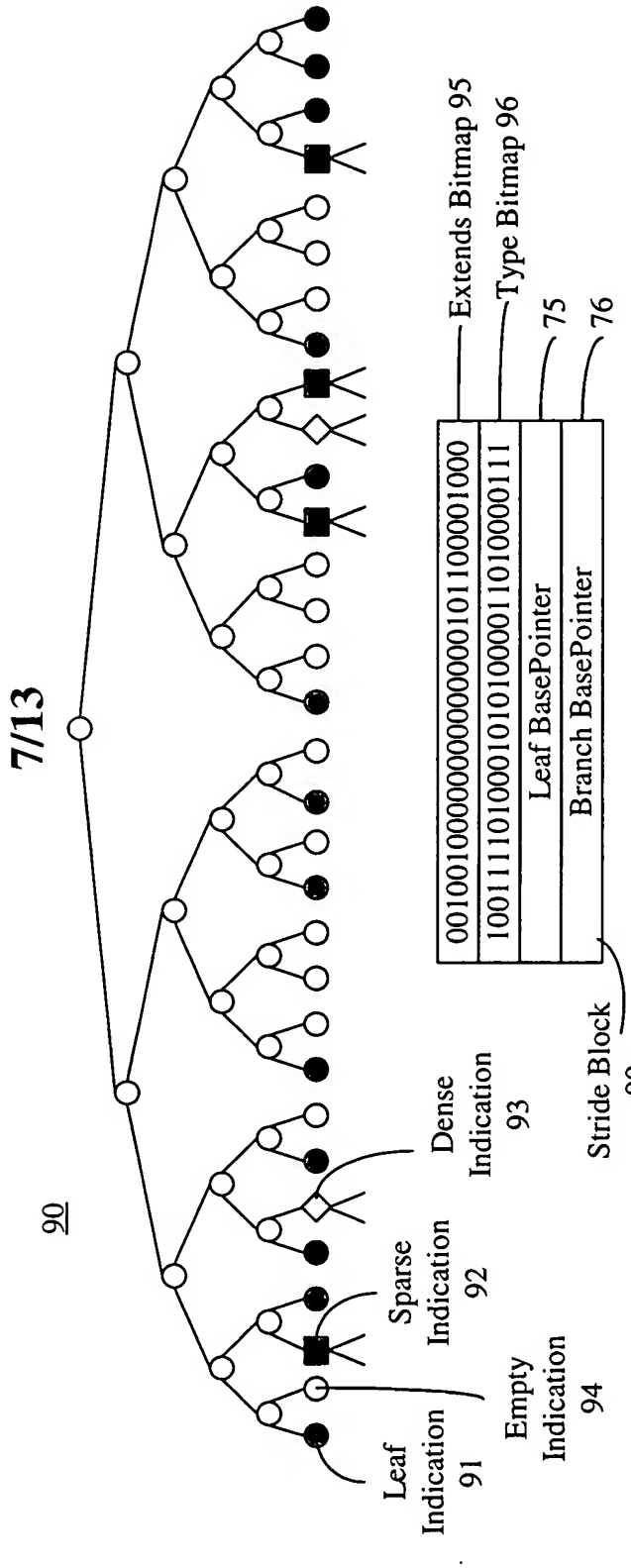

Figure 9.

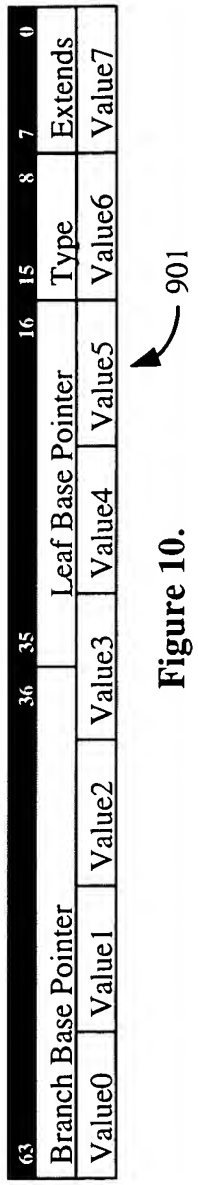

Figure 10.

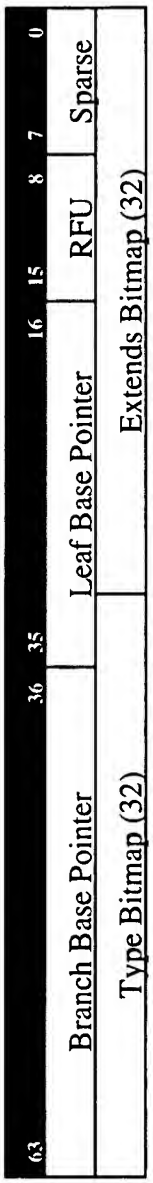

Figure 11.

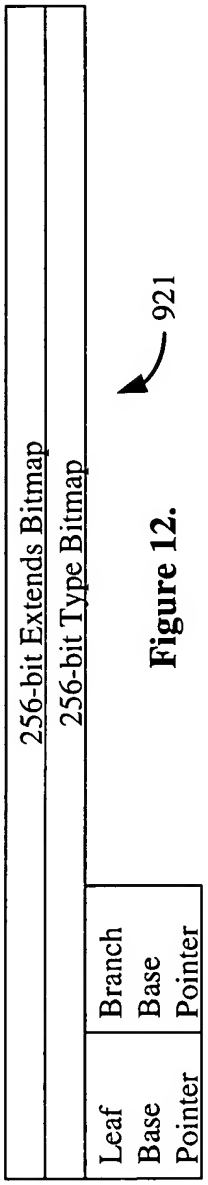

Figure 12.

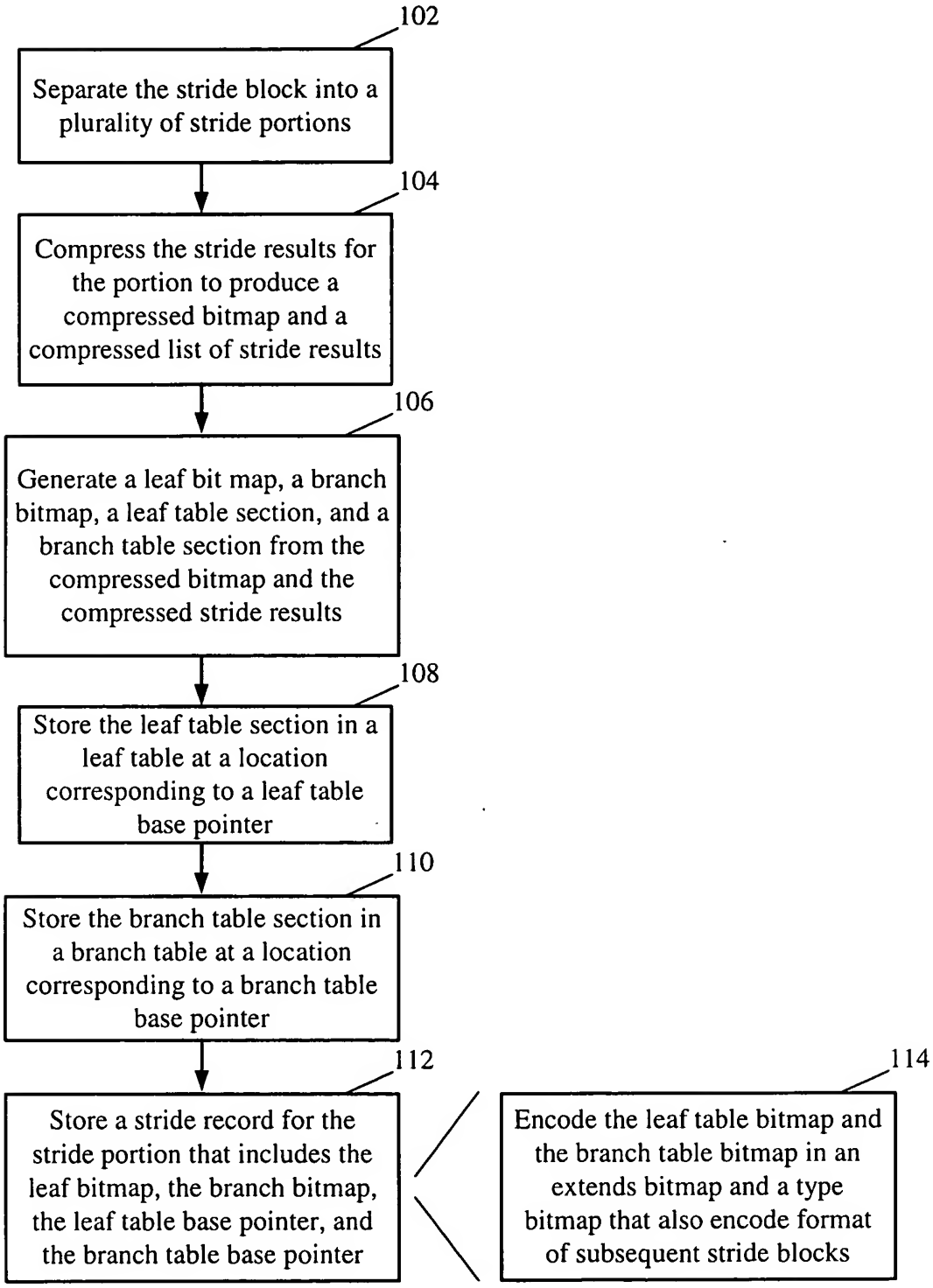
102
Separate the stride block into a plurality of stride portions
104
Compress the stride results for the portion to produce a compressed bitmap and a compressed list of stride results
106
Generate a leaf bit map, a branch bitmap, a leaf table section, and a branch table section from the compressed bitmap and the compressed stride results
108
Store the leaf table section in a leaf table at a location corresponding to a leaf table base pointer
110
Store the branch table section in a branch table at a location corresponding to a branch table base pointer
112
Store a stride record for the stride portion that includes the leaf bitmap, the branch bitmap, the leaf table base pointer, and the branch table base pointer
114
Encode the leaf table bitmap and the branch table bitmap in an extends bitmap and a type bitmap that also encode format of subsequent stride blocks

Figure 13.

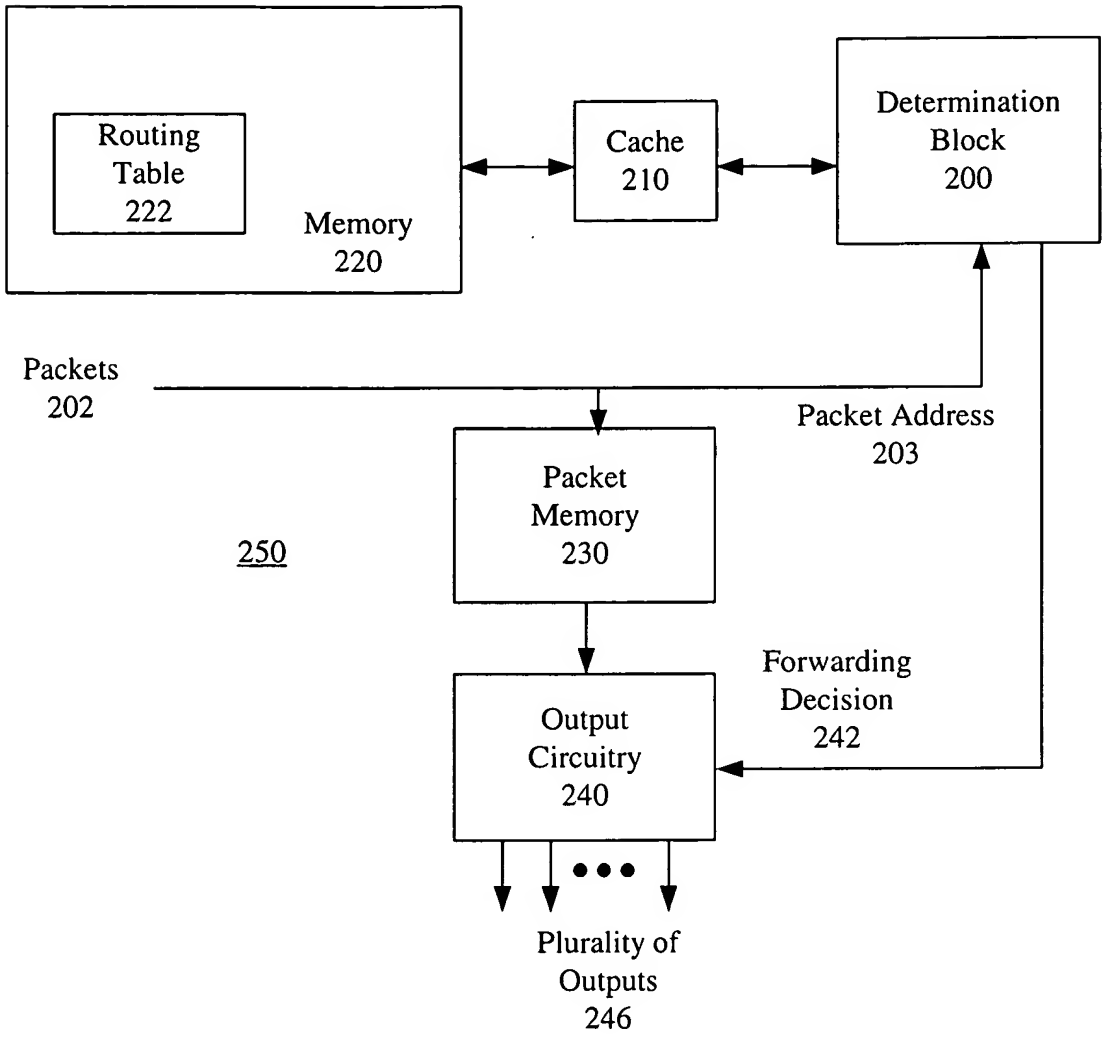

Figure 14.

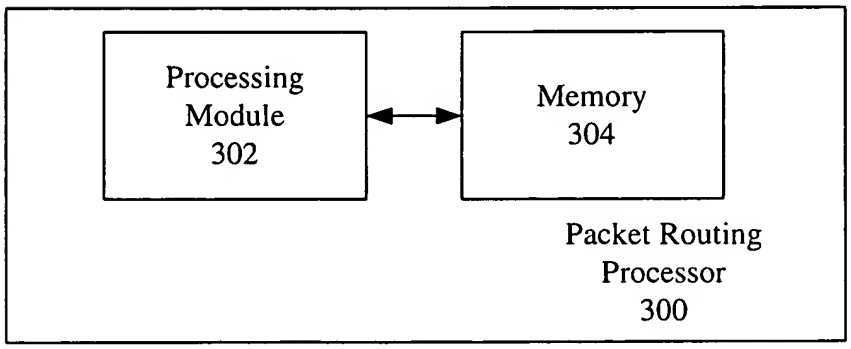

Figure 15.

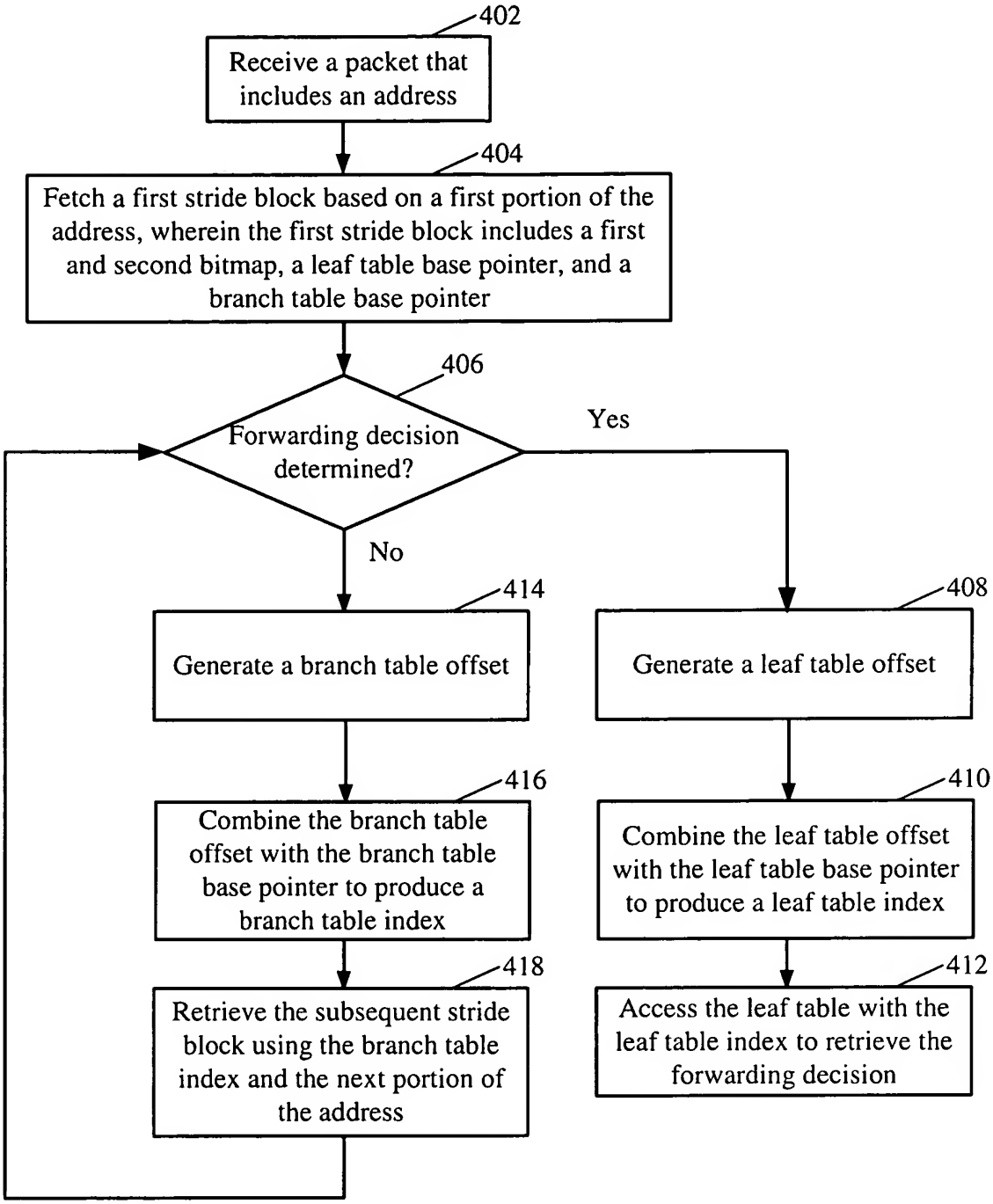
402
Receive a packet that includes an address
404
Fetch a first stride block based on a first portion of the address, wherein the first stride block includes a first and second bitmap, a leaf table base pointer, and a branch table base pointer
406
Forwarding decision determined?
Yes
No
414
Generate a branch table offset
408
Generate a leaf table offset
416
Combine the branch table offset with the branch table base pointer to produce a branch table index
410
Combine the leaf table offset with the leaf table base pointer to produce a leaf table index
418
Retrieve the subsequent stride block using the branch table index and the next portion of the address
412
Access the leaf table with the leaf table index to retrieve the forwarding decision

Figure 16.

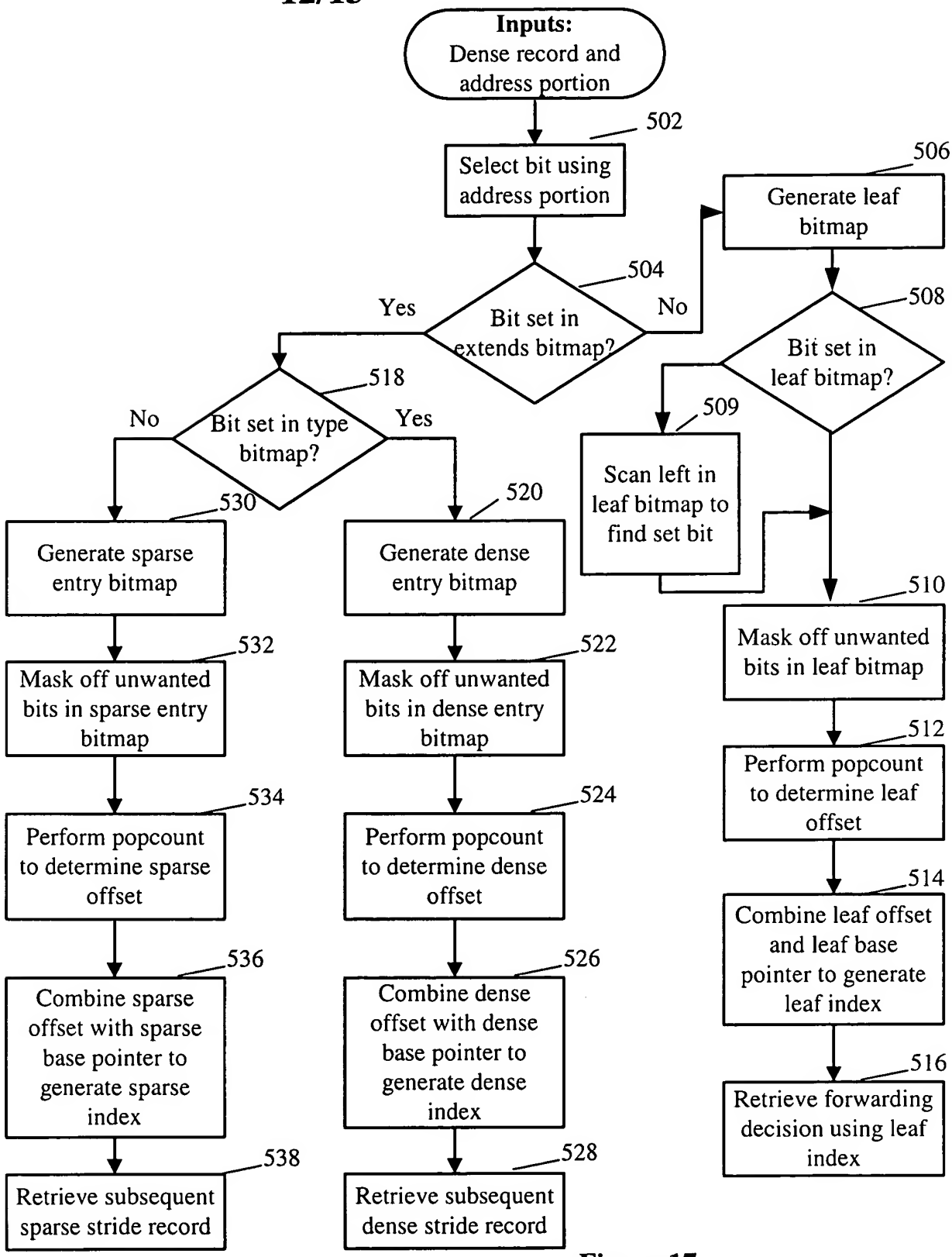
Inputs:
Dense record and address portion
502
Select bit using address portion
504
Bit set in extends bitmap?
Yes
No
506
Generate leaf bitmap
508
Bit set in leaf bitmap?
509
Scan left in leaf bitmap to find set bit
510
Mask off unwanted bits in leaf bitmap
512
Perform popcount to determine leaf offset
514
Combine leaf offset and leaf base pointer to generate leaf index
516
Retrieve forwarding decision using leaf index
518
Bit set in type bitmap?
No
Yes
520
Generate dense entry bitmap
522
Mask off unwanted bits in dense entry bitmap
524
Perform popcount to determine dense offset
526
Combine dense offset with dense base pointer to generate dense index
528
Retrieve subsequent dense stride record
530
Generate sparse entry bitmap
532
Mask off unwanted bits in sparse entry bitmap
534
Perform popcount to determine sparse offset
536
Combine sparse offset with sparse base pointer to generate sparse index
538
Retrieve subsequent sparse stride record

Figure 17.

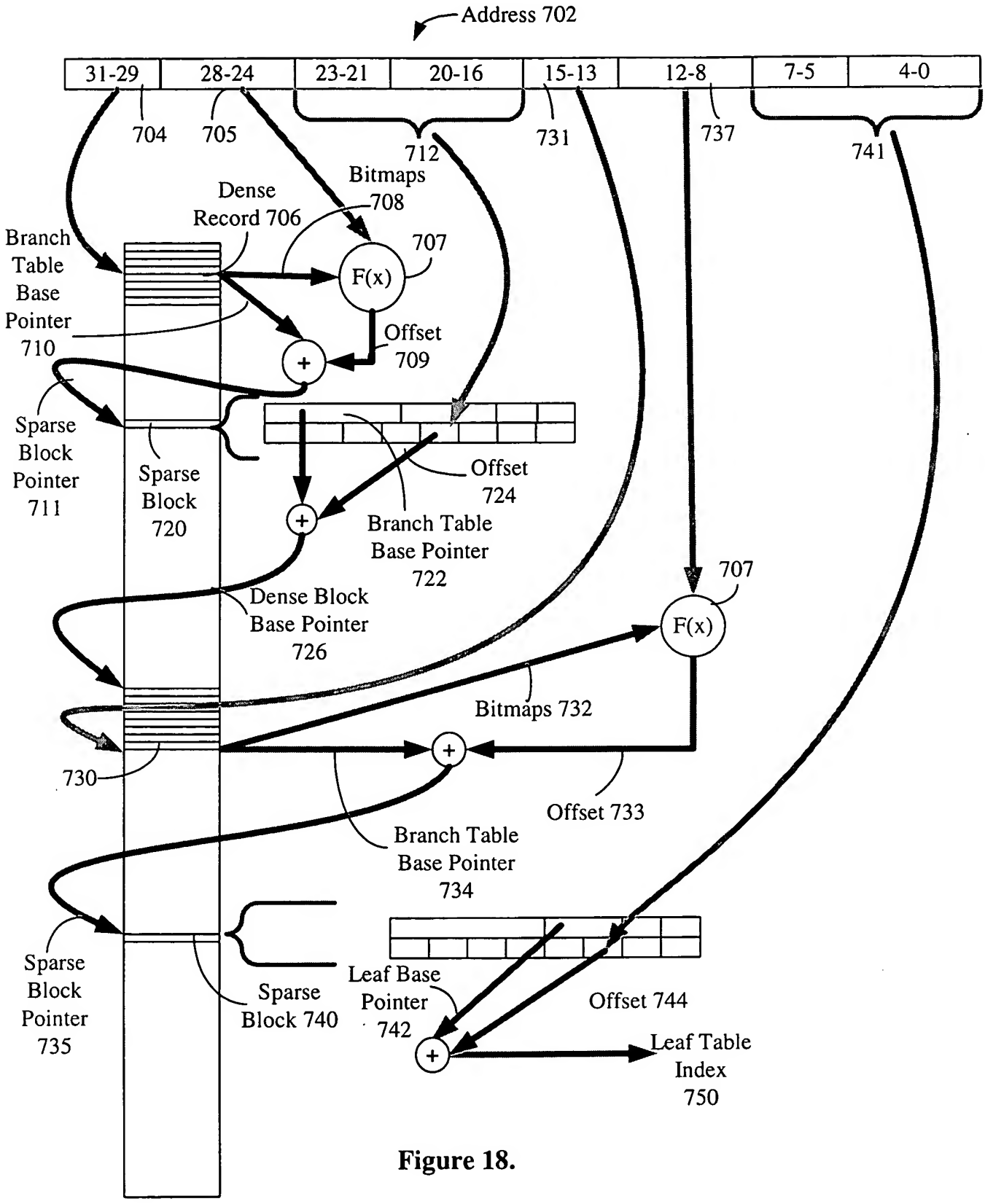
Address 702
31-29
28-24
23-21
20-16
15-13
12-8
7-5
4-0
704
705
712
731
737
741
Bitmaps 708
Dense Record 706
Branch Table Base Pointer 710
707
F(x)
Offset 709
+
Sparse Block Pointer 711
Sparse Block 720
Offset 724
Branch Table Base Pointer 722
Dense Block Base Pointer 726
707
F(x)
Bitmaps 732
730
Offset 733
Branch Table Base Pointer 734
Sparse Block Pointer 735
Sparse Block 740
Leaf Base Pointer 742
Offset 744
Leaf Table Index 750

Figure 18.